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AUTHOR Hardesty, Larry
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ABSTRACT

The history, purpose, and operation of six computer-based information networks are described in general and nontechnical terms. In the introduction the many definitions of an information network are explored. Ohio College Library Center's network (OCLC) is the first example. OCLC began in 1963, and since early 1973 has been extending its services outside of Ohio. MEDLINE and the SUNY Biomedical Communications Networks are two examples developed along general subject specialty lines. MEDLINE is a national development, while the SUNY network is regional. Educational Resources Information Center (ERIC) differs from the other examples in that it does not have a fully developed system of high speed electronic communications with on-line remote terminals. In addition, ERIC is a diffuse, field-based network with local clearinghouses collecting material in various fields. EDUCOM and ARPA are the final two examples, ones with objectives not completely realized. (WH)

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COMPUTER-BASED INFORMATION NETWORKS: SELECTED EXAMPLES

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Larry Hardesty
Box 43
Library Science 761
July 3, 1974

DEFINITION OF A "NETWORK"

The term "network" has recently become of widespread interest in the realm of librarianship and higher education. Much of this interest can be accounted for by two developments. First, with new technological developments, computer-based information networks have become a reality, or at least a probability, rather than a dream. A recent report by a panel of the National Academy of Science stated, "The primary bar to development of national computer-based library and information systems is no longer basically a technology-feasibility problem."[3] According to this report, a major problem is now economic, and institutional and organizational human related.[4]

Paradoxically, the same economic-related problems which are retarding the development of computer-based information networks on one hand are also one of the factors creating increased interest in them. For a variety of factors, education has become increasingly more expensive. Many educators believe, "Society can no longer afford to pay

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[3]Ronald L. Wigington and others, Libaries and Information Technology: A National System Challenge (Washington, D. C.: National Academy of Science, 1972), p. 10.

[4]Ibid.

probably out-of-date before it is printed. Some of the networks not included for discussion may have moved ahead of those which have been included. Also, there may have been significant recent developments, not yet reported in the literature, regarding those networks chosen for discussion in this paper.

Fourth, the writer has no extensive knowledge of the technical aspects of computers. To him, they are somewhat of a mysterious "black box" into which information can be placed and then retrieved, with great speed, in various forms.

As a result of these conditions, the scope of this paper is limited. Only major examples of types of computer-based information networks that are of possible interest to librarians are discussed. They are discussed in a non-technical manner with emphasis on their relationship to libraries, whether academic, public, school, or special libraries. Finally, a discussion of the problem of describing and defining "networks" has been included in order to place the examples discussed in their proper prospective.

INTRODUCTION

The purpose of this paper is to describe and examine major examples of types of computer-based information networks. There is no pretense that this paper presents an exhaustive study of the subject. There are several conditions which limit the scope of this paper.

First, there is a problem of defining a network. By some definitions, few, if any, of the examples discussed in this paper are actually networks. By other definitions, many types of networks have not been discussed.

Second, even with a limited definition of networks, the literature found on the subject can be overwhelming. Writing in the 1970 Annual Review of Information Science on "Design and Evaluation of Information Systems," Lancaster and Gillespie noted, "The volume of 1969 literature potentially within the scope of this chapter was enormous."[1] In one book alone, Herner and Vellucci describe thirty-five federal computer-based information systems.[2]

Third, in the quickly changing field of computer-based information networks, the literature available is

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[1] F. Wilfred Lancaster, and Constantine J. Gillespie, "Design and Evaluation of Information Systems," Annual Review of Information Science and Technology, 1970, ed. Carlos A. Cuadra, Vol. 5 (Chicago: Encyclopaedia Britannica, 1970), p. 33.

[2] Saul Herner and Matthew J. Vellucci (eds.), Selected Federal Computer-Based Information Systems (Washington, D.C.: Information Resources Press, 1972), p. iii.

for the luxury of endlessly replicating its academic resources."[5] It is a question of not only better, faster, more comprehensive information services, but also a question of saving money through sharing resources.

According to Irwin Pizer, one of the early organizers of the SUNY Biomedical Communication Network, the concept of a network as applied to library, information, and education areas is relatively new. He states that the term entered the language in 1590, but not until 1839 was it construed to convey the meaning for which it is used today. From meaning a complex system of railroads, canals, or rivers, its usuage has moved to defining relationships betwen institutions. Only in 1967 did Library Literature begin to use the word as an indexing term.[6]

An early problem was noted in relating its usuage to computer-based information systems. As long as they were not a reality, one could apply all types of definitions to the term. Writing in 1967, Weinstock noted, "Lacking such definition, we shall continue to be presented with excessively futuristic schemes which, for the most part, do not adequately respond to considerations of cost, system compatibility, and known user preference."[7]

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[5]Irwin H. Pizer, "A Regional Medical Library Network," Bulletin of the Medical Library Association, 57:2 (April, 1969), p. 101.

[6]Ibid.

[7]Melvin Weinstock, "Network Concepts In Scientific And Technical Libraries," Special Libraries, 58 (May-June, 1967), p. 329.

It is for this reason that there has been an effort to formulate a generally accepted definition of the term "network". Probably the best summary of the various efforts can be found in an article by R. C. Swank, published in 1971. In it he presents not only his own definition, but also summarized the definitions given to the term by such leaders in the field as Joseph Becker and Wallace Olsen of EDUCOM, Dr. Launer Carter of System Development Corporation, and Carl Overhage of Massachusetts Institute of Technology.[8]

Most of the definitions of networks tend to emphasize the physical or organizational aspects or both. Even the definition facetiously given by John Kemey, President of Dartmouth College, refers to the organizational aspect of networks. He stated that the Dartmouth Time-Sharing System was not a network "because what we do have works too well."[9] He was referring to the fact that networks are usually considered to involve interaction between more than one administrative unit, often a source of difficulties.

In a relatively early definition, Dr. Carter of System Development Corporation attempted to describe what he thought the characteristics of a computer-based information

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[8]R. C. Swank, "Interlibrary Cooperation, Interlibrary Communication, and Information Networks--Explanation and Definition," Proceedings Of The Conference On Interlibrary Communication and Information Networks, ed. Joseph Becker (Chicago: American Library Association, 1971), pp. 18-26

[9]John Kemeny, "The Question of Networks: What Kind And Why?" Planning For National Networking: Proceedings Of The EDUCOM Spring Conference, April 6, 1973, (Boston: EDUCOM, The Interuniversity Communications Council, Inc., 1973), p. 9

network should be. Writing in 1968, Carter, concentrating on the physical aspects of a network, contended that a network must have two or more nodes or centers of information. One center, or node, by itself, is not a network, he believed. These nodes should be interconnected by communications, and each node in the system would have remote users. The remote users should be able to get on the computer network at their demand, not when the computer is ready for them or through a batch process system. The communications network must be a high-speed, high-data rate type.[10]

Joseph Becker, both in an article appearing in the January 1969 issue of Library Trends[11] and in article he co-authored with Wallace Olsen in the 1968 Annual Review of Information Science and Technology,[12] proposed a more comprehensive, yet more restrictive, definition. Using the term "information networks," he gave the following items as characteristics of an ideal network:

"1. Formal Organization. Many units sharing a common information purpose recognize the value of group affiliation and enter into a compact.
2. Communications. The network includes circuits that rapidly interconnect points.
3. Bidirectional Operation. Information may move in either direction, and provision is made for each participant to send as well as to receive.

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[10]Dr. Launor F. Carter, "What Are The Major National Issues In The Development Of Library Networks?" News Notes Of California Libraries, 63 (Fall, 1968), pp. 405-407.

[11]Joseph Becker, "Information Network Prospects In The United States," Library Trends, January, 1969, pp. 306-317.

[12]Joseph Becker, and Wallace C. Olsen, "Information Networks," Annual Review of Information Science And Technology, 1968, ed. Carlos A. Cuadra, Vol. 3 (Chicago: Encyclopaedia Britannica, Inc., 1968), pp. 289-327.

4. A Directory and Switching Capacity. A directory look-up system enables a participant to identify the most able to satisfy a particular request. A switching center then routes messages to this unit over the optimum communications path."[13]

Becker noted that at the time of his writing (1968), there was no information networks incorporating and exhibiting the main characteristics he defined.[14] Even two years later, Carolos A. Cuadra, editor of the Annual Review of Information Science and Technology, without giving his definition, echoed Becker's comment.[15]

Becker's definition may be the most widely acknowledged definition, but others have given less restrictive definitions or placed the emphasis on only certain aspects. Overhage of M.I.T. emphasized the physical characteristics in his definition. It is the combination of computers, data circuits, and user terminals which have come to constitute an information network in the modern sense, he has written.[16]

Davis McCarn of the National Medical Library has emphasized certain aspects of the organization structure of networks. According to his definitation, there is a

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[13]Becker and Olson, "Information Networks," pp. 290-291.

[14]Ibid.

[15]Carlos A. Cuadra, "Library Automation and Networks," Network Concepts: Four Points Of View, Proceedings of the April 1, 1970 Meeting of the College and University Libraries Section, Catholic Library Association, ed. Richard A. Matzek (Haverford, Penn.: Catholic Library Association, 1970), p. 4.

[16]Carl J. Overhage, "Information Networks," Annual Review Of Information Science and Technology, 1969, ed. Carlos A. Cuadra, Vol. 4 (Chicago: Encyclopaedia Britannica, Inc., 1969), pp. 339-343.

totally decentralized network where a link exists from every terminal to every other terminal. A second type of network is totally centralized. This network has one central switch to which all terminals are connected and routes transactions from one terminal to another. Finally, a third type of network structure is the hierarchical network. This network has a pattern of subordinate terminals. Actually, writes McCain, "Most real networks are mixtures of these kinds of networks."[17] Ruth Davis, Director of the Lister Hill National Center for Biomedical Communications, has elaborated on this type of definition.[18]

Maryann Duggan, Director of Southwestern Library Interstate Cooperative Endeavor (SLICE) exemplifies another approach to the definition. She defines a network as "a systematic and planned organization of separate autonomous units interconnected for the purpose of achieving some goal that is more than any one of its units can achieve individually."[19] Her definition does not specify computers or electrical communication, but emphasizes the group planning of individual units for a purpose. She

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[17]Davis B. McCain, "Networks With Emphasis On Planning An On-line Bibliographic Access System," Information Storage And Retrieval, 7:6, December, 1971, pp. 271-272.

[18]Ruth M Davis, "The National Biomedical Communications Network As A Developing Structure," Bulletin Of The Medical Library Association, 59:1, January, 1971, pp. 1-19.

[19]Maryann Duggan, "Introduction To Networks," Indiana Seminar On Information Networks (ISIN) Proceedings, October 26-28, 1971, comp. Donald P. Hammer and Gary C Lelvis West Lafayette, Indiana: Purdue University Libraries, 1972), p. 1.

believes the organizational structure must be emphasized and is essential prior to the adoption of sophisticated computer and telecommunication methods.[20]

It is obvious that there are several closely related definitions of "networks" given by prominent individuals in the field. Each places a different emphasis on parts of the definition or adds to it, depending on their experience and point of view. Perhaps the most comprehensive definition is the one given by Swank. He indicates six major characteristics of information networks.

1. Information resources - a collection of documents or data in whatever medium.
2. Readers or users - usually remote from the main source of information.
3. Scheme for the intellectual organization of documents or data - as directories for use by readers or users.
4. Methods for delivery of resources - to readers or users - the output.
5. Formal organization - the cooperating or contracting formations.
6. Bidirectional communication networks - preferably through high-speed, long distance electrical signal transmission with switching capabilities and computer hook-ups.[21]

It is because of the various meanings given to the term "networks" that a definition is given here that was used in deciding what examples were to be included in this paper.

First, each network must have a computer-base with remote terminals. There may be only computer, or there may

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[20]Duggan, "Introduction To Networks," p. 1.

[21]Swank, "Interlibrary Cooperation, Interlibrary Communication, And Information Networks," pp. 19-20.

be several computers. Second, there must be bidirectional or multidirectional electronic communication from the remote terminals. This does not necessarily mean the ability to program from remote terminals, but it does mean the ability to query the computer's data base and receive information from it. This bidirectional or multidirectional ability also means almost instant access to the computer data base. In other words, the network will be on-line, as opposed to batch process. Third, each network will show some evidence of cooperation among its members, although this characteristic will be somewhat loosely defined in some cases.

OHIO COLLEGE LIBRARY CENTER

Perhaps the computer-based network which is attracting the most interest among librarians today is the Ohio College Library Center's network (OCLC). It is the first on-line operational library network with national potential. One author has written that this network ". . .is as important to librarianship as the space program is to science."[22]

This network has a central computer (a Xerox Sigma 5) and soon will have two (a Xerox Sigma 9),[23] both located in Columbus, Ohio, with on-line remote terminals located in user libraries. Its communication is multidirectional in the limited sense that at each remote terminal users can query the computer data base, place information into it, and retrieve information placed into it, both by the central organization and other users of remote terminals. The formal organization is through membership or affiliation with the Ohio College Library Center, a non-profit organization incorporated in the State of Ohio. There is no electronic communication among members via the terminals without going

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[22]Donald D. Henricks, A Report On Library Networks (Champaign, Illinois: University of Illinois Graduate School of Library Science, 1973), p. 18.

[23]OCLC Newsletter, June 7, 1974, p. 1.

through the central computer. Although in its beginning period there was considerable interaction between members, for such reasons as establishing optional catalog card formats, most of the interaction now appears to be between the Ohio College Library Center and individual members. Each user library signs a contract, pays expenses, and puts catalog copy into the computer data base.

From its early beginning in 1963, in the form of a feasibility study for academic library cooperation in Ohio,[24] the Ohio College Library Center has grown very quickly with apparently remarkable success. When first incorporated on July 6, 1967, it had provisions only to accept academic libraries within the State of Ohio.[25] By April 1970, OCLC began off-line catalog card production with thirty-five of its members. In August 1971, its on-line cataloging network began operation, with shared cataloging becoming operational in October[26] of that year to forty-nine member academic libraries within Ohio.[27]

Since 1971, OCLC has continually expanded its membership and affiliation. Through aid from the Office of Education and the Council of Library Resources, OCLC added terminals

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[24]Judith Hopkins, "The Ohio College Library Center," Library Resources and Technical Services, Vol 17, Summer 1973, p. 309.

[25]Frederick G. Kilgour, Ohio College Library Center: Annual Report, 1968/1969 (Columbus, Ohio: Ohio College Library Center, June 30, 1969), p. 1.

[26]Hopkins, "The Ohio College Library Center," pp. 309-311.

[27]Frederick G. Kilgour, and others, comp., The Development Of A Computerized Regional Library System, U.S., Educational Resources Information Center, ERIC Document ED 080 117, June, 1973, p. 5.

in 1971-72 in Atlanta, Georgia for the Cooperative College Library Center (CCLC) and in Hanover, New Hampshire at Dartmouth College with the New England Library Information Network (NELINET).[28] In January 1973, the Articles of Incorporation were changed so as to admit school and public libraries within Ohio. At the same time, its membership authorized OCLC to begin planning for expansion outside the State of Ohio.[29]

In March 1973, OCLC's board of directors gave final permission to extend its services to regional library groups outside of Ohio. Since that time agreements have been signed with the Library of Congress, on the behalf of certain federal libraries, the Cooperative College Library Center in Atlanta, Georgia, the Five Associated University Libraries in New York State (FAUL), the New England Library Information Network, the Pittsburgh Regional Library Center, and the Union Catalogue of Pennsylvania.[30] In December 1973, the State University of New York and the Interuniversity Library Council of the North Texas area signed a contract with OCLC.[31] Even more recently, the four biggest libraries in Illinois have been negotiating with OCLC;[32] Michigan State University has

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[28]Kilgour, The Development Of A Computerized Regional Library System, p. 5.

[29]School Library Journal, Vol. 98, January, 1973, p. 12.

[30]Frederick G. Kilgour, Ohio College Library Center: Annual Report, 1972/1973 (Columbus, Ohio: Ohio College Library Center, June 30, 1973), p. 1.

[31]OCLC Newsletter, January 15, 1974, p. 1

[32]Advanced Technology/Libraries, September, 1973, p. 1.

initiated a feasibility study whereby academic libraries of Michigan would form a consortium and join OCLC;[33] and the Bibliographic Center For Research Rocky Mountain Region has been contacted for purposes of establishing OCLC services in its area. (see appendix)

In January 1974, the governing board of OCLC decided to continue to extend services outside of Ohio. At the same time they authorized the Executive Director to initiate negotiations to acquire another computer if there would be sufficient increase in services to require it.[34] As a result, a new computer (a Xerox Sigma 9) is scheduled to be installed in October 1974.[35] Arrangements are presently being made for the National Library of Medicine to turn over copies of its computerized catalog tapes to OCLC.[36] Also, OCLC has tenatively been selected by the "Ad Hoc Discussion Group on Serials" of the Council of Library Resources as the interim site for a national serials data program.[37]

Regarding the technical aspects of OCLC, Frederick Kilgour, the director, Philip Long, and others directly involved with the organization have written several articles

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[33] Library Journal, March 1, 1974, p. 612.

[34] OCLC Newsletter, January 25, 1974, p. 1

[35] OCLC Newsletter, June 7, 1974, p. 1

[36] Statement by Susan Kirkbride, University of Wisconsin-Madison MEDLINE analyst, personal interview, Madison, Wisconsin, June 19, 1974.

[37] Laurence G. Livingston, "Composite Effort To Build An On-Line Nation Serials Data Base," Association Of Research Libraries: Minutes of the 83rd Meeting: Changing Objectives In Research Libraries, January 19, 1974. (Chicago: Association Of Research Libraries, 1974), p. 35.

concerning them.[38] A list of these articles is included in each of OCLC's annual reports. In addition, the various technical manuals of OCLC have been placed on microfiche and are available through ERIC.[39]

The original motivating idea for OCLC was the desire to create a centralized, computer-based, machine readable file that could be used for many functions. In the second annual report of OCLC, five major subsystems were reported to have been designed. They were, in planned order of implementation:

1. A shared cataloging system based on a centralized computerized catalog. Included in this project was the development of a central union catalog for location by author and title.
2. A remote catalog access and circulation control system. This system was to allow faculty members and students outside the library to determine both local institution holdings and the holdings of other institutions by author and title.
3. A bibliographic information retrieval project. This would allow users at remote terminals to search holdings from the subject point of view.
4. A serials control system.
5. A major technical processing system that would computerize most of library processing.[40]

Writing in 1972, Kilgour noted that of the five subsystems, only the shared cataloging subsystem had become

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[38] Frederick G. Kilgour, Philip Long, and others, "The Shared Cataloging System Of The Ohio College Library Center," Journal Of Library Automation, Vol. 5, September, 1972, pp. 157-183.

Frederick G. Kilgour, "Computer-Based Systems: A New Dimension To Library Automation," College & Research Libraries, Vol. 34, March, 1973, pp. 137-143.

[39] Kilgour, and others, The Development of A Computerized Regional Library System, Final Report and Appendixes, ERIC Documents ED 080 117 - ED 080 123.

[40] Kilgour, Annual Report, 1968/1969, p. 3.

operational.[41] Included in this system was symbols placed on the bibliographic record for those member institutions that possessed a particular title.[42] Therefore, the shared-cataloging subsystem included a union catalog function, which is eventually to develop into an interlibrary loan system.[43] It is believed that this is the only subsystem in full operation to date.

In 1971, a poll was taken of member institutions as to their view of priorities. Overwhelmingly, they wanted a technical processing system and serials control.. The circulations system was a distant third. This has resulted in increased emphasis on the technical processing and serials control subsystems, with a de-emphasizing of the development of the circulation and remote catalog access subsystems.[44]

A briefing paper on OCLC issued by the U.S. Office of Education in the Spring of 1973 indicated that the technical processing subsystem was due for implementation in the Fall of 1973,[45] but the author can find no evidence of this occuring. According to this paper, the technical processing subsystem would initially provide:

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[41]Kilgour, "The Shared Cataloging System Of The Ohio College Library Center," p. 158.

[42]Ibid., p. 181.

[43]Hopkins, "The Ohio College Library Center," p. 318.

[44]Kilgour, The Development Of A Computerized Regional Library System, p. 2.

[45]Laurence Papier, "Ohio College Library Center: A Briefing Paper," FLC Newsletter, April/May, 1973, p. 10.

> ". . .for creation of technical processing records, automated production of purchase orders, on-line update of records, automatic claiming of overdue orders, production of accounting records, and purging of records. . .additional outputs to be implemented are numerous.[46]

A report at the 83rd meeting of Association of Research Libraries in January 1974, indicated that OCLC would soon implement an on-line serials cataloging and input capability.[47] The status of the other subsystems is not known. (see appendix)

So far most of the emphasis and interest has been on the only operating subsystem: shared-cataloging. The basis of this subsystem is the Library of Congress's MARC II records, but it also allows cataloging input by member libraries. In fact, OCLC has found that its data base is increasing at a more rapid rate from the shared cataloging input than it is from the MARC II input. The MARC II record averages an input of 300 records per day, while the users of OCLC are adding an average of 600 records per day.[48] By July 6 1973 there were 652,114 catalog records in the on-line system, with MARC II records and user-input records in almost equal numbers. Interestingly, the user-input records show a much greater use,[49] even though MARC II records take precedence over any cataloging record placed in by a user.[50]

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[46]Papier, "Ohio College Library Center," p. 10.

[47]Livingston, "Composite Effort To Build An On-Line National Serials Data Base," p. 35.

[48]Hopkins, "The Ohio College Library Center," p. 317.

[49]Kilgour, Annual Report, 1972/73, p. 2

[50]Kilgour, "The Shared Cataloging System Of The Ohio College Library Center," p. 181.

Basically, the system works in the folowing manner. Each user of the system has in their own library one or more cathrode ray tube terminals. Using this terminal, the operator can call up OCLC records by one of four methods: (1) an LC card number search; (2) a title search; (3) an author-title search; or (4) an OCLC control number search. If the record is in the data base and the right search key has been submitted, the full catalog record is then transmitted onto the screen in vertical format. If the book being cataloged and the information on the screen agree, the operator can type in the information needed to bring the catalog copy into conformity with the local library's standards.

If the OCLC data base does not have catalog copy for that particular book, the operator may insert his own. In either case, the operator provides holding information. When the information is arranged to the operator's satisfaction, he then depresses the PRODUCE and SEND keys, and the information is recorded at OCLC in Columbus, Ohio.[51]

Each user library has a profile in OCLC's computer containing the specific arrangement and type of information wanted on its cards. This allows for flexibility, a major advantage to the system. Options include, Library of Congress or Dewery Decimal classification; one, two, or

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[51]Hopkins, "The Chio College Library Center," p. 314-315.

three line call numbers; and prefiling according to dictionary or divided catalog arrangements. Numberous other options are available.[52] The cards are usually reported to arrive at the library in about a week.[53]

Cost and evaluation of this subsystem has not been clearly defined. There have been several comments in the literature by librarians using the system. Most of them favorable, allowing for the human tendency not to advertise ones mistakes. Also, the reports have generally come from within Ohio, with the exception of the Dartmouth project. This may be because the movement of OCLC outside of Ohio has been so recent that articles concerning it have not yet had time to be published.

A sampling of the literature has found articles concerning the merits of the network at Walsh College in Canton, Ohio,[54] the Ohio State University,[55] and a few other libraries.[56] Not all comments have been favorable.

In an article published in 1973, Ohmes and Jones of Florida State University questioned some of the effects

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[52]Papier, "Ohio College Library Center," p. 8.

[53]Ron Miller, "NELINET: A Regional Network," Association Of Research Libraries: Minutes Of The 80th Meeting: New Opportunities For Research Libraries, May 12-13, 1972. (Atlanta: Association Of Research Libraries, 1972), p. 65.

[54]Patricia Lyons and Margaret Northcraft, "OCLC: A Users Viewpoint," Catholic Library World, Vol. 44, December, 1972, pp. 265-268.

[55]Dan L. Kniesner, and Betty J. Meyer, "On-Line Computer Techniques In Shared Cataloging," Library Resources And Technical Services, Vol. 17, Spring, 1973, pp. 225-230.

[56]Advanced Technology/Libraries, October, 1973, pp. 4-5.

the network might have on the card catalog of a large university library.[57] Others have questioned the computer and terminal equipment. According to Papier, unless a conversion is developed, the computer program can only be operated at installations using a Xerox Sigma series computer.[58] The problem of equipment was discussed at the Eightieth Meeting of the Association of Research Libraries.

Speaking at this meeting, Lawrence Livingston of the Council of Library Resources noted that, although OCLC is one of the best systems of its kind, one of the reasons for its efficiency is that all the software is tailored to library application. Even the operating system had been modified for efficiency in library operations. This has led to two major problems. First, in order to copy the OCLC program without major recoding, one has to copy the hardware exactly. Second, even to recopy the program exactly, the system has been so modified that Xerox no longer maintains it. The maintenance now has to be taken care of by OCLC.[59]

At the same meeting, Richard De Gennaro, Director of Libraries, University of Pennsylvania, commented on this

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[57]Frances Ohmes and J. F. Jones, "The Other Half Of Cataloging," Library Resources and Technical Service, Vol. 17, Summer, 1973, pp. 320-329.

[58]Papier, "Ohio College Library Center," pp. 8-9.

[59]Laurence Livingston, "Technology And The Library," Association Of Research Libraries: Minutes of the 80th Meeting: New Opportunities For Research Libraries, May 12-13, 1972, pp. 70-76.

problem. While noting the promise of the OCLC network, he pointed out that it is a prototype system. He called for more observation of its operation before any efforts to duplicate it. At the present time, he stated:

> "The system is still very dependent on its initial designer's for operation and maintenance. Documentation is very incomplete. The operating system is custom-made and unique. It may eventually become a limitation and liability because of this uniqueness and constant rigidity.
>
> The entire system is hardware bound. . .and bound to the hardware of a minor computer manufacturer, and a terminal manufacturer beset with serious financial and production problems."[60]

Kilgour, of course, is not in complete agreement with these reservations.

He contends that the OCLC operation has been so modified that there is little dependence on Xerox equipment.[61] Concerning maintenance, he wrote in his fifth annual report that the equipment has proven to be highly reliable. "During a three-month period, the terminals operated at 92% uptime," according to him. Also, the Xerox Sigma 5 computer far exceeds 95% uptime.[62] Obtaining a supply of the necessary cathrode ray tube terminals has been a major problem, but Kilgour reported in his sixth annual report the negotiation for a specially designed cathrode ray tube terminal.[63]

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[60]Richard De Gennaro, Discussion of "Technology And The Library," Association Of Research Libraries: Minutes Of The 80th Meeting: New Opportunities For Research Libraries, May 12-13, 1972, pp. 79-80.

[61]Advanced Technology/Libraries, March, 1973, p. 5.

[62]Frederick G. Kilgour, Ohio College Library Center: Annual Report, 1971/1972 (Columbus, Ohio: Ohio College Library Center, June 30, 1972), p. 5.

[63]Kilgour, Annual Report, 1972/1973, p. 5.

The most comprehensive effort to evaluate the network to date has been done at Dartmouth College. This was a six month study funded by the Council on Library Resources from January 1972 to June 1972. The results were used by the New England Library Information Network (NELINET) in deciding whether or not to duplicate OCLC.[64]

A simulation study showed that the use of the OCLC system by NELINET was technically possible. Also, in actual practice, the cataloguers at Dartmouth were able to retrieve catalog copy for seventy to seventy-five percent of their attempts. This included only English language monographs, and not government documents. The government document retrieval ranged from thirty-four percent early in the period to a high of seventy percent late in the period.[65]

Attempts to assign costs or savings to the use of the OCLC network have so far been somewhat elusive. Perhaps, this may be because any amount of savings at a particular library is highly subject to that library's particular staffing patterns, processing procedures, and volume of cataloging. Despite this, one of the primary purposes of OCLC is "to lower the rate of use per-student library costs."[66]

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[64] Advanced Technology/Libraries, June, 1972, p. 5.

[65] Ron Miller, "NELINET: A Regional Network," p. 65.

[66] Kilgour, Annual Report, 1967/1968, p. 1.

Several figures have been given out by OCLC and participating members. At Dartmouth, the library was able to reduce its cataloging staff, through attrition, by seven full-time positions and three full-time equivalent part-time positions. Dartmouth concluded that if it were to pay full OCLC fees, at that time, they could readily meet projected costs and still show a budgetary decrease. This included savings of over $16,000 in rental charges for MT/ST and MCRS.[67]

Other users have reported savings, and Kilgour is confident that the system will save users money. Papier, optimistically, projects that with a thousand public libraries joining the OCLC network or similiar networks, they would save around three million dollars for shared cataloging, technical processing, and serials subsystems. Total savings for the three subsystems would be around twenty million dollars.[68] He did not give the basis for this projection. Henricks is much more cautious. He considers the cost figures to be very vague and advised cautious study of them.[69] Even according to OCLC, much depends on what degree libraries take advantage of attrition because of increase productivity of staff members.[70]

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[67]Kilgour, The Development Of A Computerized Regional Library System, p. 34.

[68]Papier, "Ohio College Library Center," p. 12.

[69]Henricks, A Report On Library Networks, p. 20.

[70]Frederick G. Kilgour, "Objectives And Activities Of The Ohio College Library Center," Indiana Seminar On Information Networks (ISIN), Proceedings, October 26-28, 1971, comp. Donald P Hammer and Gary C. Lelvis (West Lafayette, Indiana: Purdue University Libraries, 1972), p. 41.

The next year or two may prove to be the real test of OCLC's merits. OCLC appears to be going ahead with expanding its services, both by type and geographically. Recently a $2.2 million dollar budget and the purchase of a Xerox Sigma 9 computer was approved by the Board of Trustees.[71] In the past, OCLC has had a great deal of support from sources outside its user libraries. Reported amounts, although they may have been later reduced, include, $581,000 from the State of Ohio,[72] $210,135 from the U.S. Office of Education,[73] $193,333 from the Ohio State Board of Regents,[74] and two grants from the Council of Library Resources, one for $75,000[75] and another for $194,000.[76] In addition, installment payments to Xerox were arranged to be made on a delayed basis.[77]

It appears that OCLC will now be relying entirely on its user libraries for funds. According to reports, funding from the Council on Library Resources is ending,[78] and the subsidy from the State of Ohio has been paid out.[79] Income from OCLC users has been on a study increase from $65,333[80] in

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[71] OCLC Newsletter, June 7, 1974, p. 1.

[72] Advanced Technology/Libraries, March, 1973, p. 1.

[73] Papier, "Ohio College Library Center," p. 8.

[74] Kilgour, Annual Report, 1972/1973, p. 10.

[75] Papier, "Ohio College Library Center," p. 8.

[76] Kilgour, Annual Report, 1972/1973, p. 10.

[77] Kilgour, The Development Of A Computerized Regional Library System, p. 2.

[78] Advanced Technology/Libraries, February, 1974, p. 7.

[79] Advanced Technology/Libraries, March, 1973, p. 3.

[80] Kilgour, Annual Report, 1968/1969, p. 11.

1969 to $444,871 in the year ending in June 1973.[81] Much of this increase has been due to expansion outside the State of Ohio, possibly as a source of additional needed funds, and an increase in membership fees, which assigns all costs to cataloging production.[82]

Membership fees had a 100% increase in 1972 with a 50% increase effective July 1, 1973.[83] The recent OCLC announcement of a flexible billing policy used a library cataloging 10,000 titles as an example for costs. In this example the annual costs ranged from $16,920 to $18,000 for an OCLC member user, and $8,497 to $9,040 for a non-OCLC member user, depending on method of payment.[84]

Whether membership and user costs will continue to climb is not known. Costs, of course, will have a big influence on the success or failure of OCLC, but according to one article, "OCLC's technical success makes dropouts unlikely."[85] Members have cut staff while increasing the number of titles catalogued. The commitment is such that "most of them can't get out now," Kilgour has stated.[86]

Several questions about OCLC have not been fully answered. Increasing costs, new technical problems and

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[81] Kilgour, Annual Report, 1972/1973, p. 16.

[82] Kilgour, Annual Report, 1971/1972, p. 10.

[83] Advanced Technology/Libraries, March, 1973, p. 4.

[84] OCLC Newsletter, June 7, 1974, p. 2.

[85] Advanced Technology/Libraries, March, 1973, p. 4

[86] Ibid.

loss of key personnel may still threaten its success. Despite this, OCLC is probably the most important technological development to affect libraries on such a wide scale in recent years. Its success or failue will have considerable influence on future developments of this type.

MEDLINE AND THE SUNY BIOMEDICAL COMMUNICATIONS NETWORK

In the field of computer-based information networks developed along general subject speciality lines there have been two relatively recent major networks. The earlier of the two is the SUNY Biomedical Communications Network, a regional development. The later one is MEDLINE, a national development. Both rely heavily, as does OCLC, on a data base developed by an agency of the federal government. In this case, the data base is the National Library of Medicine's Medical Literature Analysis and Retrieval System (MEDLARS).

MEDLARS is the result of a long history of the National Library of Medicine's bibliographic control of medical literature, beginning in 1879 with the publication of Index Medicus. By 1961 the monthly Index Medicus averaged 450 pages in length and contained references to more than 10,000 articles.[87] Because of the rapidly growing size of this publication, the National Library of Medicine decided

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[87]U.S., National Library of Medicine, The MEDLARS Story At The National Library Of Medicine, (Washington: Government Printing Office, 1963), p. 1.

to plan a new and highly mechanized system. A contract was awarded to the General Electric Company in August 1961, and by January 1964, a new system of using magnetic tape had been put into operation.[88]

This system, MEDLARS, was the first operational photocomposition system. As a by-product, the system could produce individual bibliographies ("demand searches") for a requesting health professional. The demand for this service increased so by 1970 a total of 24,000 searches were done from ten computers within the United States and eleven computers in foreign countries. Under this system, searches were done off-line through a batch-type process at the written request of a qualified health professional. It usually took three to four weeks for the requester to receive the finished bibliography.[89]

During this same period of time (1960-1970) others had become interested in the use of computers for dissemination and storage of information. In 1965 the State University of New York became one of the founding members of the Interuniversity Communications Council (EDUCOM)(discussed later in this paper), whose aim was to develop a nation-wide computer network. These plans have not yet been realized, but in 1965 the State University of New York began taking

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[88]Charles J. Austin, MEDLARS, 1963-1967.(Washington: Government Printing Office, 1967), p. 3.

[89]Davis B. McCarn and Joseph Leiter, "On-Line Service In Medicine And Beyond," Science, Vol. 18, July 27, 1973, p. 319.

some steps of its own. In March of that year an Intrauniversity Communications Committee (INTRACOM) was established in an effort to establish a university-wise program. Several plans and programs were promoted by all sectors of the university, but the only survivor of this original committee is a system called the SUNY Biomedical Communications Network.[90]

This network was originally conceived to tie the four medical centers of the State University of New York (SUNY) together with the general goal of amplifying their resources and thus providing greatly improved services to the medical community. By the time it became operational in the Fall of 1968, it had nine participating libraries from federal, state, and public institutions.[91]

The founders of this network had several ambitious plans. First, it was to be approached from the point of view of user services. For bibliographic searches, a user, without going through a librarian, was to be able to obtain his citations from the MEDLARS data base. At the time the system started MEDLARS consisted of five years of Index Medicus citations from approximately 2000 medical journals, or more than 1.2 million citations.[92]

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[90]Willis E. Bridegram, Jr. and Erich Meyerhoff, "Library Participation In A Biomedical Communication And Information Network," Bulletin Of The Medical Library Association, Vol.58, April, 1970, pp. 103-104.

[91]Irwin H. Pizer, "A Regional Medical Library Network," Bulletin Of The Medical Library Association, Vol. 52, April, 1969, p. 102.

[92]Irwin H. Pizer, "How Does The Network Serve The Researcher?" Indiana Seminar On Information Networks, October 26-28, 1971, p. 65.

A second element of the data base is catalog records. This includes the National Library of Medicine's computer-produced book record, in addition to book records in three SUNY medical libraries from 1962-1969. By 1969 this totaled some 40,000 records.[93]

The network also planned to engage in the production of a union list of serials for more than sixty SUNY libaries, which was to be included in the computer data base. All the circulation records of networks libraries were to be included.[94]

The original computer, an IBM 360/40, later replaced by a larger computer when the network headquarters moved from Syracuse to Albany, New York in 1971, was to handle all this information, according to its manufacture. But with the loading of the data base and programing in instructions, so much of the core storage had been used that it could handle only twenty-five terminals. Part of the reason for this inability to predict needed computer capacity was the fact there was no comparable operational network of that size and scope up to that time.[95]

Several elaborate objectives were drawn up for the network. First, as previously stated, the network was to be designed so that users could query the data base without

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[93]Pizer, "How Does The Network Serve The Researcher?" p. 65.

[94]Ibid.

[95]Ibid., p. 50.

assistance. The computer was programed to do such things as to accept the letters "Y" and "N" in lieu of yes and no because it was believed typing should be kept to a minimum because most people are so poor at it.[96]

Second, a program was to be produced so that a user could type in a code number next to the citation of a book or journal citation he wanted. The computer would then check to determineits location. If it was within the user's library, the computer would check circulation records and report back to the user. If not, it would report the nearest library in the network which had the cited item.

If the item was a journal article, the computer was to have searched the union list of serials records. If it was in the user's library circulation records were to be checked and the necessary information given to the user. But if it was not, the computer would determine the nearest network library which could supply it. Unless the user refused the serive, the computer was to have then had an interlibrary loan request automatically typed at the supplying library and a copy at the users library.[97]

A total of fourteen objectives were originally drawn up. They included:

1. A computerized catalog of textbooks and monographs, with in-depth indexing, such as chapter by chapter subject analysis, of the member libraries.

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[96]Pizer, "How Does The Network Serve The Researcher?" p. 67.

[97]Ibid., p. 67-68.

2. A Union list of serials and books with options for printouts of holdings of specific libraries.
3. Computerized accession lists.
4. Bibliographic searches of MEDLARS tapes on-line.
5. Current Awareness and selective dissemination services.
6. Recurring bibliographies.
7. Automatic interlibrary loan retrieval when a journal or book was not in requestor's library.
8. Central computerized ordering, circulation records, and serials records.[98]

All these objectives have not been accomplished.

First, it was found that searches by untrained users are much less relevant than searches obtained by a trained search analyst. Second, libraries did not put their circulation records into the data base, for a variety of reasons. The automatic generation of inerlibrary loan requestions also has not been put into operation at last report, but plans to add additional sources to the data base, such as Chemical Abstracts, has been partially completed.[99]

The SUNY biomedical Communications System appears to be operating at a satisfactory level and has added participants as far west as Minnesota,[100] and its searches of MEDLAR tapes compares favorably with MEDLINE searches.[101] Recent reports in the literature of its operations are

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[98]Bridegram and Meyerhoff, "Library Participation," pp. 105-106.

[99]Pizer, "How Does The Network Serve The Researcher?" p. 70.

[100]Library Journal, April 1, 1973, p. 1074.

[101]Isabel Spiegel and Janet Crager, "Comparison of SUNY and MEDLINE Searches," Bulletin Of The Medical Library Association, Vol. 61, April, 1973, pp. 205-209.

sparse, but relatively recent reports (1970,1971) indicate some of its objectives have been achieved and others are partially implemented.[102] [103]

Examples of completed or partially completed services, reported in 1970, are:

1. A computerized catalog of textbooks and monographs, with in-depth indexing - achieved for the file of the Upstate Medical Center.
2. Bibliographic searches of MEDLARS tapes - available on-line
3. A computerized current catalog of the combined book catalogs of the network available through on-line terminals.- achieved through the National Library of Medicine's Current Catalog. Also two of the members report completing their catalogs.
4. A current awareness and selective dissemination service - available through each terminal is a current awareness service, with an experimental selective dissemination service available at one member library.
5. Direct interlibrary communication - available for interlibrary loan requests, administrative messages, etc., but not for automatic interlibrary loan requests.[104]

During the period of development of the SUNY network, the National Library of Medicine cooperated with it, while making plans for a national biomedical communications network.[105] Through the Medical Library Assistance Act of 1965, regional medical libraries were established. The National Library of Medicine contracted with a series of institutions to provide specialized MEDLARS service for users located in their respective areas. To

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[102] Bridegram and Meyerhoff, "Library Participation," pp. 105-106.

[103] Pizer, "How Does The Network Serve the Researcher?" p. 69.

[104] Bridegram and Meyerhoff, "Library Participation," pp. 105-106.

[105] Davis, "The National Biomedical Communications Network," pp. 1-19.

facilitate the formation of a network, the Lister Hill National Center for Biomedical Communication was created.[106]

In 1967 the National Library of Medicine began to experiment with on-line bibliographic search service, and early experiments showed that a flexible, reasonably effective, and useful retrieval system could be developed.[107] By 1970, it decided to initiate a pilot study. In January of that year it began publishing the Abridged Index Medicus, an index to 100 top journals in clinical medicine. Its acceptance by the biomedical profession suggested its usefulness as a data base.[108]

The National Library of Medicine then contracted with the System Development Corporation (SDC) to provide the experimental service. A computer provided by SDC was connected with the Teletypewriter Exchange Network already in existence in approximately 500 medical institutions, which resulted in considerable savings. This system, AIM-TWX, began in June 1970.[109]

Based on the response of the medical community and the evaluation of the AIM-TWX by Lancaster,[110] and other

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[106] Ruth Davis, "The Relationship of Regional Networks To The National Library of Medicine's Biomedical Communications Network, The Bookmark, January, 1969, p. 113.

[107] McCain and Leiter, "On-Line Service In Medicine," p. 321.

[108] Ibid.

[109] Davis, "The National Biomedical Communications Network," pp. 17-18.

[110] F. W. Lancaster, Evaluation Of On-Line Searching In MEDLARS (AIM-TWX) By Biomedical Practioners (Champaign, Illinois: University of Illinois Graduate School of Library Science, 1972).

researchers,[111] the National Library of Medicine decided to go ahead with an on-line network. In December 1971, the first phase of MEDLARS on-line (MEDLINE) went into operation. In this phase, local telephone access provided ties between the ten regional libraries and the National Library of Medicine.

One of the concerns in setting up this intial phase was the cost of communication. Although the cost per search could be reduced to about $3, the cost for a direct dial, long distance telephone call to perform such a search could cost over $6. The National Library of Medicine decided to minimize this cost to users by establishing a basic network that would provide local or low-toll costs to a large portion of its users. After intial negotiation, a contract was established with TYMSHARE, Inc.[112] TYMSHARE is one of a group of data transmission services known as value-added networks which promise much lower communications costs. A recent announcement indicates even a greater reduction of communication costs through the use of this type of system.[113]

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[111] Wilhelm Moll, "AIM-TWX Service At The University Of Virginia: A Review And Evaluation," Bulletin Of The Medical Library Association, Vol 59, July 1971, pp. 458-462. Nancy G. Blase, and Carole J. Stock, "An Experimental Cancer Information Service Using AIM-TWX," Bulletin Of The Medical Library Association, Vol. 60, January, 1972, pp. 115-120. Wilhelm Moll, "Observations On The AIM-TWX Service At The University of Virginia Medical Library," Bulletin Of The Medical Library Association, Vol. 60, Oct., 1972, pp. 571-574.

[112] McCain and Leiter, "On-Line Service In Medicine," p. 322.

[113] Advanced Technology/Libraries, April, 1974, p. 5.

Through this arrangement a hierarchical type network has been established working through a centralized data base. A channel has been established to each of the ten regional medical libraries, and then onto the National Library of Medicine. A recent article reports that there have been established over forty nodes, including one in Paris. Other MEDLINE users institutions are able to gain access by calling through one of these nodes.[114] There is no toll charges now to access to the network, and an arrangement for "equal access" has been established.[115]

By the end of 1973, MEDLINE provided services on-line to more than 250 institutions in the United States, and the establishment of an interface with the ARPA network (discussed later in this paper) has made possible direct on-line access from the National Library of Medicine to Hawaii, Alaska, and Western Europe.[116]

Early in 1973, the National Library of Medicine began charging customers for its services. The fee schedule is $6 an hour for searches and 10¢ a page for off-line printing. Part of this change was due to the intensive use of the system, which placed a strain on the MEDLINE budget and computer capacity.[117] By that time MEDLINE searches had

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[114] McCain and Leiter, "On-Line Service In Medicine," p. 322.

[115] "Report Of The National Library Of Medicine," Association Of Research Libraries: Minutes of 83rd Meeting, p. 147.

[116] Ibid.

[117] Advanced Technology/Libraries, February, 1973, p. 1.

reached an annual rate of over 200,000.[118]

In an effort to keep up with the demands, the computer at the National Library of Medicine has been upgraded by replacing an IBM 370/155 with an IBM 370/158.[119] Also, a $240,000 a year contract has been negotiated with the SUNY Biomedical Communications Network for use of its facilities. This will allow access to SUNY's more extensive data file and utilization of its IBM 370/155 computer.[120] In 1973 a total of seven computers were reported to be tied into the system, all of them networked in such a way that a user could switch from one to another without redialing.[121]

The present service consists of an on-line, computerized, bibliographic searching service. This is the service most associated with the MEDLINE network. This service searches a data base consisting of citations from approximately 2,400 major journals indexed for Index Medicus, International Nursing Index, and Index To Dental Literature, for approximately the past two to three years. A service known as BACKFILE offers two additonal areas for searching. First, MEDFILE will search 1200 core medical journals for 1970-71, and the second, COMPFILE, will search the remaining 1200 journals for this period.[122]

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[118]"Report Of The National Library Of Medicine," p. 147.

[119]Ibid.

[120]Library Journal, April 1, 1973, p. 1074.

[121]McCain and Leiter, "On-Line Service In Medicine," p. 323.

[122]Susan Kirkbride, personal interview, June 19, 1974.

In 1973 an on-line catalog data base, CATLINE, containing approximately 100,000 monographs cataloged at the National Library of Medicine since 1965 became available. This allows users to request cataloging information, but does not offer catalog copy service, such as OCLC.[123] A serials data base, SERLINE, of approximately 5,000 biomedical serials with locator codes for 117 medical library institutions in the United States is also available.[124] Finally, a service known as SDILINE, Selected Dissemination of Information On-Line, is offered. This service allows users to keep abreast of recent articles on one or more authors or subjects. It covers the current month of MEDLINE, and is run automatically, every month.[125]

MEDLINE offers several advantages to the users and has been favorably evaluated. In his evaluation of MEDLINE's immediate predessor, AIM-TWX, Lancaster noted that a great majority of the searches conducted as part of his experiment could not have been conducted in Index Medicus due to difficulty in manipulating concepts. Further more, the AIM-TWX attracted users who had not previously used the MEDLARS off-line batch searches or not even been regular users of the medical library.[126] A more recent study of MEDLINE use at

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[123]"Report Of The National Library Of Medicine," p. 147.

[124]Ibid.

[125]Susan Kirkbride, personal interview, June 19, 1974.

[126]Lancaster, Evaluation Of On-Line Searching, pp. 12-13.

the Medical Library of the University of Virginia Medical Center, 93.5% of the users surveyed indicated their belief that, "MEDLINE is a substantial improvement over traditional methods of searching through printed indexes."[127]

A comparison of the two major biomedical communications networks has been done on a limited basis by the College of Medicine and Denistry of New Jersey Library, at the request of the Lester Hill National Center for Biomedical Communications. The New Jersey study noted several differences between the two systems, including costs, methods of searching, format and content of citations retrieved, and hours of operation. The key difference, they found, as far as the inquirer is concerned, is the number of journals indexed in the retrievible data bases.[128] SUNY can retrieve citations for approximately 2,300 journals as far back as 1964 from the MEDLARS data base. MEDLINE was established on the premise that fewer journals from more recent years would be sufficient to serve user needs. Its accessible data base can retrieve citations for 1100 journals to approximately 1969. It was this premise that MEDLINE wanted the New Jersey Library to test.[129]

The method of study was to compare the 1969 through 1971 portions of 165 research requests run through their

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[127]Wilhelm Moll, "MEDLINE Evaluation Study," Bulletin Of The Medical Library Association, Vol. 62, January, 1974, p. 4.

[128]Spiegel and Crager, "Comparison of SUNY and MEDLINE Searches," p. 205.

[129]Ibid.

SUNY terminal and then determine how many of the citations would have been retrieved through MEDLINE. They did not take into consideration the relevancy of the citations. The results, depending on the subject, was that MEDLINE, working from a smaller data base of journal titles, retrieved from 52.4 to 99.2 percent of the citations retrieved by the SUNY system. In almost every subject the percentage of SUNY's citations retrieved by MEDLINE was much higher than the percentage of SUNY's journals also in MEDLINE's data base. The researchers concluded that it would appear that the journals for MEDLINE's data base had been wisely selected.[130]

It has been noted that since this study MEDLINE has extended its services and data base in several ways. Also, it is now linked with the SUNY Biomedical Communications Network and can draw additional resources through it. McCain and Leiter, both of the National Library of Medicine, have written that the development of the MEDLINE network through on-line search nodes on computers in the TYMSHARE system has "broad implications" for other fields.[131] They concluded that:

> ". . . the ability to implement a major network . . . in a period of 1 year reflects a maturation of many of the on-line and network developments of the past several years and presages a major extension to a wide variety of applications in the fields of science, technology, and education during the current decade."[132]

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[130]Spiegel and Crager, "Comparison of SUNY and MEDLINE Searches," pp. 205-209.

[131]McCain and Leiter, "On-Line Service In Medicine," p. 323.

[132]Ibid., p. 324.

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Since the mid-1960's the education field has witnessed the development of another subject-related network. This network, ERIC, is a national, decentralized, information system designed by the U.S. Office of Education, and now operates under the National Institute of Education. This system defers from the networks previously discussed in this paper in several ways.

While there is strong evidence of it being a cooperative network with a computerized data base, it does not have a fully developed system of high speed electronic communications with on-line remote terminals. It has been suggested that the data base be made widely available through ERIC,[133] but most of the effort in the direction of networking has been made by groups outside of ERIC. A brief account of the development of ERIC is given in this paper, but the main emphasis will be on the recent effort in Wisconsin to use the ERIC computer data base to develop a centralized computer-based information network with remote terminals.

For many years control over reports as a result of federally-sponsored research was very weak. Once submitted

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[133]William J. Parsley, "Improving A Field-Based 'ERIC-like' Information System," Journal Of The American Society For Information Science, Vol. 22, November-December, 1971, pp. 399-408.

to the federal government and receiving intitial distribution, many rapidly went out of print and were no longer easily accessible. With the launching of Sputnik in 1957, the federal government began to offer increased support for research in education and the volume of resulting reports increased. By 1959, the Office of Education became interested in developing an information retrieval and dissemination system for these reports. They authorized a pilot study to demonstrate the feasibility of such a system within the field of education.[134]

Not until 1965 did ERIC begin to receive sufficient support for its implementation. At first, this money came for support of education for the disadvantaged under the Elementary and Secondary Education Act of 1965. A preliminary effort consisted of the organization and dissemination of 1,740 documents of what has become known as the "Disadvantaged Collection".[135]

Because of the decentralized nature of American education, education's many specializations, and the existence of numerous professional organizations, ERIC was designed as a network of "clearinghouses" located across the country in "host" organizations that were already strong in the field of education in which they would operate.[136]

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[134]Brian W. Carass, "The Development And Operation Of An Education Resources Information Clearinghouse - (ERIC)," Proceedings Of The 1968 Clinic On Library Applications Of Data Processing, Dewey E. Carroll, ed. (Urbana: University of Illinois Graduate School of Library Science, 1969), p. 39

[135]M. Lorraine Mathies and Peter G. Watson, Computer-Based Reference Service (Chicago: American Library Association, 1973), p. 13.

[136]U.S. Educational Resources Information Center, ERIC, A Profile (Washington: Government Printing Office, 1974), p. 1.

During 1965-1966 the firsttwelve of the Educational Resources Information Clearinghouses were established. The exact number of clearinghouses has fluctuated over time, and there are currently sixteen. Each has responsibility within the network for acquiring the significant educational literature within their particular specialization. They then select the most relevant material of highest quality for processing into the network's data base.[137]

The clearinghouses are just one of six interrelated components of the network. The other five are:

1. A headquarters staff (Central ERIC), located in Washington D.C. It provides overall management, policy and technical direction.
2. A private contractor who operates the ERIC Processing and Reference Facility. This contractor provides a centralized computer and other technical services, particularly in developing the tape version of ERIC's monthly abstract journal, Research In Education, (RIE).
3. The U.S. Governmemt Printing Office who is the printer and distributor of RIE.
4. Macmillan Information who publishes ERIC's index to educational periodical literature, Current Index to Journals In Education (CIJE), and other basic ERIC products.
5. The ERIC Document Reproduction Service, which is operated by a private contractor. This contractor sells reports cited in RIE, either in microfiche or hardbound copy.[138]

ERIC established four major objectives in its beginning:

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[137]ERIC, A Profile, p. 2.

[138]Mathies and Watson, Computer-Based Reference Service, p. 15.

1. The network should guarantee ready access to the world's English language literature relevant to education.
2. The network should generate new information on important topics. Falling in this category have been bibliographies, state-of-the-art papers, critical reviews, and similiar materials.
3. The network should strength channels of dissemination of educational research.
4. The Network should provide a base for developing a national education information network to effectively link knowledge producers and users in education.[139]

In an effort to reach these objectives ERIC founders made a decision that documents should be made available from a central source, instead of just informing users that a given document existed. This system has two limitations. First, ERIC has so far met with firm opposition from publishers who have objected to the inclusion of copyrighted materials in RIE or distribution via microfiche.[140] Therefore, only non-copyrighted documents are reproduced and distributed, unless, of course, permission is given.

A second limitation on the achievement of ERIC's objectives, is that it believed it could not support all users' documents needs. ERIC reached a decision that the reproduction service must be self-supporting, and users pay for the reports they want. Also, the dissemination of ERIC's computer data base was not to be subsidized by

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[139]Lorraine Mathies, "The Educational Resources Information Center; An Agent Of Change," Journal Of Educational Data Processing, Vol. 7, April, 1970, p. 124.

[140]John F. Vinsonhaler and Robert D. Moon, "Information Systems Application In Education," Annual Review Of Information Science And Technology, 1973, ed. Carlos A. Cuadra, Vol. 8 (Washington: American Society For Information Science, 1973), p. 282.

the taxpayer. Users wishing it must meet order processing, tape, and duplication costs. To limit its investment, the federal government generates the fundamental data base and then permits private companies to market it.[141] As has been noted, this does not encourage the development of a nation federally-supported, computer-based information network.

This is not to say that these tapes are not used. The data base tapes, costing between $240 to $360 on a quarterly basis in 1973,[142] have been purchased by several university systems, state and local education agencies, and private companies. In February 1970, Central ERIC announced the availability of QUERY, a software package for use at approved locations using ERICTAPES, as the tapes are called.[143] Lockheed Research Laboratories offers a service using the tapes for on-line interactive searching, and Systems Development Corporation has a similiar service. The SDC/ERIC data base is linked with the TYMSHARE Corporation's communication network in over thirty-two cities,[144] and probably comes closest to being a national network.

The State of Wisconsin has recently put into operation a computer based on-line information network using the ERICTAPE.

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[141] ERIC, A Profile, p. 1.

[142] James L. Carmon, "Computer-Readable Data Bases: Library Processing And Use," Association Of Research Libraries: Minutes Of The 82nd Meeting: Coping With Change: The Challenge For Research Libraries, May 11-12, 1973. (New Orleans: Association Of Research Libraries, 1973), p. 5.

[143] Mathies and Watson, Computer-Based Reference Service, p. 23.

[144] Ibid.

The Wisconsin Information Systems for Education service (WISE-one) is funded by the University of Wisconsin-Madison School of Education.[145] Operating from the Univac 1108 computer at the University of Wisconsin-Madison campus, the network has on-line terminals at University campuses at Stout, Milwaukee, and Green Bay; the Department of Public Instruction in Madison; and ten vocational schools within the State.[146]

This network is connected by telephone lines through the Dial Access Intercity Network (DAIN), which has a cost of approximately 7¢ per minute.[147] Total costs to on-line users is estimated to be relatively inexpensive. One estimate placed the total cost for one month to a user to be $300 to $400. This includes terminal rental, computer time, and telephone expenses for thirty to fifty searches.[148] Individual searches are done on the University of Wisconsin-Madison's campus at a remote terminal which cost the requestor from 50¢ to $3, depending on the number of citations retrieved.[149] Both off-line and on-line production of bibliographic information is available.

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[145] Tom Olson, and others, "Wisconsin Information Systems For Education - WISE." (Madison: Wisconsin Information Systems For Education, 1974), (Mimeographed.), p. 1.

[146] Statement by Al Roberts, manager, MACC user services, personal interview, Madison, Wisconsin, June 25, 1974.

[147] Ibid.

[148] Statement by Roy Tully, supervisor, Information Retrieval Center, Department of Public Instruction, personal interview, Madison, Wisconsin, June 20, 1974.

[149] Statement by Cheryl Gotts, WISE-One terminal operator, personal interview, Madison, Wisconsin, June 20, 1974.

The Department of Public Instruction utilizes its terminal for a service called WIRE (Wisconsin Information Retrieval for Education). This is a demonstration project for the purpose of providing bibliographic searches for individuals doing research in education. It appears to be particularly aimed at teachers, school administrators, and individuals involved in similiar activities. A fee of $10,00 is charged for each search.[150]

Although information is not complete, this system appears to be one of the few non-commercial on-line services utilizing ERIC tapes through remote terminals over a wide geographic area. It has been in operation only a few months so it is probably too soon to measure its success, but individuals working with it have hopes that it is an indication of future developments with ERIC tapes.

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[150]Roy Tully, personal interview, June 20, 1974.

EDUCOM AND ARPA

So far this paper has dealt with four networks: OCLC, the SUNY Biomedical Communications Network, MEDLINES, and ERIC. Despite their differences, they all have some things in comon. For one, they are all in operation and in use by librarians and educators. Another aspect, not so evident, is that, despite their seeingly huge undertakings and accomplishments, each network has as its objectives the achieving of really only a small portion of the total informational needs relating to education. This portion of the paper will deal with a group who has far more reaching objectives, not yet realized.

EDUCOM, the shortened name of the Interuniversity Communications Council, has been previously mentioned in this paper in connection with the founding of the SUNY Biomedical Communications Network. EDUCOM also had its beginning in the desire of medical educators to make use of advances in communications. Early in 1964 a small group of medical educators, including Dr. Ward Darley, then executive director of the Association of American Medical Colleges, meet to discuss ways to use recent advances in communications to train medical students and physicians. What they soon realized is that the new and promised developments in

communication affected not only medicine but education in a whole range of disciplines and professions.[151]

As a result, the members widened their scope. In October 1964 a nonprofit council was incorporated in Michigan, and representatives of six major universities sent delegates to an initial meeting in Denver. By the time the establishment of EDUCOM, made possible by a $750,000, five-year Kellogg Foundation grant, was publically announced in mid-1965, eight universities had become charter members.[152]

The major purpose of this group is to promote the creation of an interuniversity communications network. This proposed multimillion dollar, multimedia network is to eventually interconnect all colleges and universities throughout the country.[153] The first major activity of EDUCOM to achieve this objective consisted of a summer study at Boulder, Colorado, in July 1966.

With support provided by the National Science Foundation, the National Institute of Health, the National Library of Medicine, and the U.S. Office of Education, 181 participants, representing forty-two institutions of higher learning and a wide range of professions, met for four weeks

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[151]Carle Hodges, "EDUCOM," Audiovisual Instructor, April, 1967, p. 353.

[152]George W. Brown, James G. Miller, and Thomas A. Keenan, EDUNET (New York: John Wiley & Sons, Inc., 1967), p. 6.

[153]H. Eugene Kessler, "Educational Computing and Networking: A Review And Prospect," EDUCOM, Vol. 9, Spring 1974, p. 2.

to discuss network communications.[154] They examined the then-present status of networks, defined information resources available, and outlined applications to be served.[155]

The report of this summer study, published in 1967 by a major American publisher in the form of a 440-page book, recounts the deliberations, reports, and conclusions given at the conference. The report indicated the summer study approached educational networking from three points of view:

1. It attempted to identify the informational needs of the various campus disciplines.
2. It attempted to catalog the types of applications that lend themselves to networking; and
3. It investigated the capabilities of advanced technology to manipulate and distribute multimedia information.[156]

One of the major conclusions reached at this conference was that EDUCOM should undertake the establishment and evaluation of a pilot EDUNET (as the proposed educational network came to be known).[157] Each EDUCOM institution, either from its own funds or from grants for which it would make independent application, would pay for its development and connection to this network.[158] They set the completion date for this pilot project as June 1970.[159]

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[154]Hedges, "EDUCOM," p. 353.

[155]Robert Hayes and Joseph Becker, Handbook Of Data Processing For Libraries (New York: Wiley-Becker-Hayes, 1970), p. 54.

[156]Becker and Olson, "Information Networks," p. 296.

[157]Brown, EDUNET, p. 334.

[158]Ibid., p. 367.

[159]Ibid., p. 347.

Although EDUCOM has since grown until it has over 100 member universities, colleges and other institutions of higher education in the United States and Canada, and has received an additional $600,000 five-year grant in 1969 from the Kellogg Foundation,[160] its plans for even a pilot EDUNET have yet to be realized. During the period since 1966, EDUCOM has served mainly to disseminate information, foster cooperation, and to provide a forum for cooperation. It has Spring and Fall Conferences, occasionally sponsors workshops and research projects, and has its own magazine, EDUCOM. It has had some responsibility in the establishment of the national medical information network for the National Library of Medicine, and for a comparable study for the National Agricultural Library.[161]

More recently, EDUCOM has been involved in cooperation with the evaluation of OCLC,[162] During the Winter of 1972-1973, EDUCOM members held a series of seminars sponsored by the National Science Foundation.[163]

As evidenced by articles in EDUCOM and other sources, EDUCON has taken a definite interest in network possibilities

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[160] EDUCOM, September, 1969, p. 7.

[161] Hayes and Becker, Handbook Of Data Processing, p. 54.

[162] EDUCOM, Spring, 1972, p. 1.

[163] EDUCOM, Spring, 1974, p. 3.

of a defense department project. The ARPA network, or ARPANET, a project of the Advanced Research Project Agency of the Defense Department, has become the main candidate for developing into a nationwide communications network. According to one observor:

> "There is considerable pressure for universities, government agencies, and other organizations to be allowed to join the network. . . . It is clear that there is a movement toward removing the network from the status of a DOD-sponsored research activity and evolving it into a 'commercially' run network"[164]

Again referring to the ARPA network, a recent article in EDUCOM reported:

> "At several EDUCOM conferences, Dr. Laurence Roberts, then Director for Information Processing Techniques at the Advanced Research Projects Agency, . . .has described what is probably the most efficient means yet devised for interconnecting heterogeneous digital computers."[165]

The ARPA network begin in 1968 with the purpose of fostering computer cooperation and communication between approximately fourteen contractors of the Advanced Research Projects Agency, all of them doing research on the development of advanced information-processing techniques.[166] By the Spring of 1974, the resulting network had connected several dozen heterogeneous computers at leading universities

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[164]David J. Farber, "Networks: An Introduction," Datamation, Vol. 18, April, 1972, p. 36.

[165]Kessler, "Educational Computing," p. 3.

[166]D. C. Engelbart, Advanced Intellect-Augmentation Techniques, U.S., Educational Resources Information Center, ERIC Document ED 061 732, February, 1972.

and research organizations from Hawaii to Norway.[167] [168]

The unique feature of this system which makes it so attractive to EDUCOM is its ability for communication between different types of computers and for the interconnected computers to draw upon each others programs, functions, and storage capacity. The result is a distributed network. Each computer in the network is connected together either directly or indirectly, which is to be distinguished from a centralized network where all sites are connected together through a central site.[169]

The advantages of this system are obvious. The University of Illinois, in one example, reports the costs of a $40,000 a month operation being reduced to about $16,000 per month by the replacing of the use of one of its computers with the remote use of a computer at the University of California in San Diego.[170] One researcher reported at an EDUCOM meeting that in his study of meteorlogical problems that he used not only his own research institution's IBM 360/65 computer, but by means of the ARPA network, he also used an IBM 360/91 at UCLA and an IBM 360/75 at the University of California in Santa

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[167] Kessler, "Educational Computing," p. 4.

[168] Michael S. Sher, "Experience In Networking-A Case," EDUCOM, Vol. 8, Fall, 1973, pp. 8-13.

[169] Farber, "Networks: An Introduction," p. 36.

[170] Sher, "Experience In Networking," p. 10.

Barbara.[171] Harvard University has reported being able to take advantage of slow times in computing resources throughout the country by use of the network.[172] As a result of the number of users, a whole system of network protocol and cooperation has developed. UCLC recently reported that it maintained some fifty different charge numbers for ARPANET user accounts.[173]

The heart of this network is a small, specially programed computer called an Interface Message Processor (IMP) which is connected to the host computer of each institution or research organization. The IMP is used to store and route messages to other IMP's, to check for errors in transmission lines, and, most important, to allow for digital interface between host computers, since computers typically differ from one another in type, speed, word length, operating systems, and various other ways.[174] Any host or IMP can fail without disturbining the network. In fact, the IMP is touted to be a large

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[171]Robert Rapp, "Computing In Higher Education: Success and Prospects," EDUCOM, Vol. 6, Winter, 1971.

[172]Thomas Cheatham and others, "ARPA Update: Harvard Use of ARPANET," Planning For National Networking: Proceedings Of The EDUCOM Spring Conference, 1973, p. 84.

[173]William Kehl, "The UCLC Campus Computing Network: An ARPANET Resource," EDUCOM, Vol. 8, Winter, 1973, p. 12.

[174]Stanley Winkler, "The Network Control Center For The ARPA Network," Computer Communications: Impact And Implications. The First International Conference On Computer Communication, October 24-26, 1972, ed. Stanley Winkler (Washington, D.C., 1972), p. 185.

box, "which never needs to be touched, and never has maintenance except through the network."[175] Several technical reports have been written about the IMP.[176]

Whether the ARPA network will develop into a component of the multimedia network EDUCOM is planning remains to be seen. A great deal depends on federal financing.[177] It would appear that EDUCOM is still moving in the direction of a national network. In March 1974, it announced that it had received a $39,000 grant from the National Science Foundation to develop plans for a simulation model of an "inter-institutional" computer network. Libraries are to be included in this project.[178]

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[175]David Loye, "EDUCOM And Computer Networks In Higher Education: A Report On The Fall Meeting," EDUCOM, Vol. 5, Winter, 1971, p. 3

[176]See 1970 Spring Joint Computer Conference, Atlantic City, New Jersey (May, 1970); AFIPS Conference Proceedings, Vol. 36 (AFIPS Press, Montvale, New Jersey, 1970)

[177]Al Roberts, personal interview, June 25, 1974.

[178]Advanced Technology/Libraries, March 1974, p. 7.

A SUMMARY OF THE PAST DEVELOPMENTS AND A LOOK INTO THE FUTURE

In the past several pages the development of several major computer-based information networks has been discussed. There has been an attempt to deal with several questions. What is a computer-based network? What constitutes cooperation? Is a networks structure centralized, decentralized, hierarchical, or some other form? Is its communication system unidirectional, bidirectional, or multidirectional? Obviously only the surface has been touched in attempting to answer these questions. As stated in the introduction, this whole area is fast-moving and only a few major examples have been chosen for discussion. Almost each new issue of the journals seems to announce new developments in the area.

Several networks, or potential networks, some of major importance, have been only mentioned briefly or not discussed at all. The New England Information Network (NELINET)[179] Association of Southeastern Research Libraries (ASERL)[180] both appear to be on the verge of following OCLC's example.

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[179] Advanced Technology/Libraries, October, 1973, p. 5.

[180] Library Journal, April 1, 1973, p. 1074.

New Jersey's Computer Aided Processing and Terminal Access Network (CAPTAIN) may become IBM's first network system.[181] Other reports have discussed the potential of Stanford University's BALLOTS and SPIRES operation in terms of networking.[182]

Also moving in the direction of networking, although not necessarily in terms of cooperative efforts, have been several federal and commercial developments utilizing machine-readable data bases. Gechman has presented one discussion of the significance of these data bases in information retrieval.[183]

The federal government has been particularly important in the developments of this type, if not vital. MARC tapes and MEDLAR tapes have already proved the bases of networks. ERIC tapes may do the same, and the Cataloging AND Indexing System (CAIN) of the National Agricultural Library and several other federal data bases are being seriously discussed as the basis of future networks.

Several non-governmental machine-readable data bases, such as Biological Abstracts and Chemical Abstracts, also have potential in networking, and some are already bei[illegible]g

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[181] Advanced Technology/ Libraries, March, 1973, p. 4.

[182] See various papers presented in Communication For Decision Makers: Proceedings Of The American Society For Information Science, 34th Annual Meeting, Denver, November 7-11, ed. by Jeanne B. North, Vol. 8 (Westport, Conneticut: Greenwood Publishing Co., 1971).

[183] Marvin C. Gechman, "Machine-Readable Bibliographic Data Bases," Key Papers On The Use Of Computer-Based Bibliographic Service, ed. Stella Keenan (Philadelphia: National Federation of Abstracting and Indexing Services; Washington: American Society of Information Sciences, 1973), pp. 9-36.

utilized. Specifically related to libraries is the entrance of several commercial firms into on-line catalog card production. In a full-page advertisement on the inside front cover of the March 15, 1974 issue of Library Journal, Information Dynamics announced the upgrading of its BIBNET service to an on-line network status,[184] comparable in many ways to OCLC.[185] Inforonics, Inc. also has entered the field, and another firm, Science Press, has been operating since 1969, but on a limited basis.[186]

The future may not be entirely bright for commercial developers of these on-line networks. Cost for retrieval services are particularly high, and as has been shown, what the federal government does greatly influences the development of these networks. For example, MEDLINE, while providing great visibility to the development, have almost given away their product. Its price of $6 an hour and approximately 1¢ per citation compares quite favorably with the advertised prices of the System Development Corporation's services. They vary from $25 per hour computer time and $10 per hour TYMSHARE communication costs, plus 8¢ per citation for an ERIC search to $90 per hour computer time and $10 per hour TYMSHARE communication costs, plus 25¢ per citation for a search of its Life Sciences data base.[187]

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[184] Library Journal, March 15, 1974, inside front cover.

[185] Advanced Technology/Library, February, 1974, p. 2.

[186] Advanced Technology/Library, November, 1973, p. 4.

[187] System Development Corporation, "SDC Search Serice," Advertisement Pamphlet, 1974.

One source has suggested that it is unlikely that anyone will begin making money in commercial networking in this decade, expecially if the federal government continues to expand its services.[188] McCain and Lester have predicted:

> ". . .extensive testing in the 'market place' will inevitably result in a much needed shake-down of information systems."[189]

In conclusion, it would appear that the entire area of computer-based information networks is in its early stages of rapid expansion. How far it will go and the impact it may have either through major successes or failures, it is difficult to determine. Some attempts with extensive pretesting and limited goals, such as MEDLINES, have been highly sucessful. Other attempts with broader goals, such as EDUCOM, have not yet realized them. There may be too much eagerness to computerize everything, but, given the growth of computer and communication technology, it sometimes appears that the computer can do everything. In any case, the developments in this field will greatly effect "traditional" librarianship, along with almost every other aspect of our lives.

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[188] Advanced Technology/Libraries, April, 1974, p. 5.

[189] McCain and Leiter, "On-Line Service In Medicine," p. 324.

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BIBLIOGRAPHICAL CENTER FOR RESEARCH
ROCKY MOUNTAIN REGION, INC.

TERMS OF NEGOTIATION WITH OCLC: Replies to questions raised by Board February 9, 1974 as received by Board Committee March 4, 1974

Present: Kenneth E. Dowlin, Barry L. Porter, Henry G. Shearouse, Phoebe F. Hayes, and Frederick Kilgour.

1. Contract Terms

   a. Must be firmed up betwen Bib Center and OCLC - See contract document - to be referred to Bib Center legal counsel.
   b. Must contain policy statement allowing local manipulation of data - If by local manipulation of data we mean ability to attach a printer, to receive tape for our own purposes, including fiche production, this language is not entirely contained in the copy of the contract furnished to us.
   c. Must specify time span (term of contract) - OCLC desires a 4-year contract term.
   d. Must include withdrawal clause - The contract contains terms allowing OCLC to terminate it on the basis of non-use; our legal sounsel should determine its extent of protection to us.
   e. The individual user should be permitted to serve other libraries, e. g., the Bib Center or other user might act as an agent for subcontracting with other users - Does not appear feasible unless Bib Center set itself up as form of processing center, using mini-computers and printing our own cards. This would require one or more especially designed mini-computers, at a cost of $30,000 each, purchased from OCLC, a 1403 printer, staff and a separate contract.
   f. Exclusive rights within the region defined by the Bib Center should be granted to the Bib Center - OCLC will not grant exclusive rights; allegedly liable for Justice Department action if granted. Contract does allow us to spell out our area.
   g. Must specify services to be provided; service expansion potential must be explored and defined - Contract stipulates present services and allows contract extension/new contract for new services.
   h. Must include amending language - Does not allow precisely for amending language, but would appear to allow memoranda of understanding supplemental to contract.

2. Time Schedule

a. Must follow as outlined in our Position Statement - Bib Center to review outline in Position Statement.

b. Must be reviewed after the first negotiation session - Review to determine the initial commitments from participating institutions (and the terms of commitment).

c. Initial starting date for minimal number of users must be established - Bib Center to agree with OCLC on minimal number of users. OCLC would like to see system operative by end of 1974.

d. There must be a stipulated date for availability of terminals - Terminal availability probably would precede transmission line availability. Terminals are on order with BEEHIVE. Twenty-nine weeks after order given to AT&T by OCLC for transmission line availability.

3. Bib Center Policies

a. Specifications or policies under which we propose to function must be prepared - Bib Center must establish this policy statement, including overhead charges, initial operating and training functions; initial input policy; future catalog maintenance policy; billing arrangements; standards for input cataloging. Must establish all costs.

b. Bib Center must establish its own position vis a' vis state agency contracts and the respective coordinating functions of each party regarding agreements with individual users within each state - Negotiations must start with state agencies and policy position regarding state agency role prepared. Agreement/ contract/memoranda document must be prepared in each state.

4. Other

a. There must be a decision on use level: minimum number of users, volume, and number of terminals - No decision at Columbus on exact number of institutions. Minimal monthly catalogin: at least 3,000 titles per year for any one institution. One terminal for every 12,000 titles cataloged. No decision as to minimum number of terminals; the more terminals, the cheaper the cost.

b. There must be a decision as to input contribution by Bib Center - Input contribution agreed. Must be more specifically defined as to volume and standards.

c. Cost justifications for equipment, transmission and services must be definitive and possible of reliable use by Bib Center in obtaining individual commitments -

Cost figures for equipment were obtained. Transmission costs to be furnished as soon as preliminary list of intended users furnished to OCLC. Contract specifies present services available.

d. There must be a decision regarding lease vs. purchase of terminals - Investigation of costs, leasing arrangements must be made by Bib Center. OCLC would maintain terminals leased; if Bib Center owned or used own leasing arrangements, would be responsible for maintenance. A leasing arrangement might be more attractive financially to smaller libraries.

e. Can OCLC furnish any model regarding catalog volume, staff use, etc.? - Not enough information regarding a "model" exists.

FURTHER QUESTIONS, ETC. RE: OCLC

1. Who will bear future R & D costs? Conversion costs from Sigma 5? New programs? - No question that conversion costs, R & D etc. will be borne by users.

2. Any basic cost increases presently contemplated? What is history of rate increases? Subsidy status? - Basic cost increases not presently contemplated, but negotiable yearly under contract. It is intended that OCLC function w/out subsidy in future.

3. Is present policy-making body to remain with Ohio Libraries? Representation from other groups? - There will be an advisory group or seven members selected from those participant groups outside Ohio; these representatives to be elected by the groups. Would not guarantee representation for each group except on a rotational basis. Representatives would be advisory only, without vote.

4. How would Bib Center be able to recapture its own input? Where would be the proprietary interest? Could we have a printer interface in Denver with the console? Could we get a fiche product or a tape off the on-line system? Relate to question 8. - Input recapture from Bib Center could be via tape. Printer interface possible and OCLC could make a printer available. Tape from system could be used to produce fiche at our expense. Cost to obtain locations -0, except for line charges.

5. Bib Center should be the central control for Ill - e.g., loan requests should continue to be filtered through region. - Bib Center as central control would not be necessary unless locations not available via OCLC or we wrote into state contracts proviso to use present regional locations first or until no longer necessary.

BIBLIOGRAPHICAL CENTER FOR RESEARCH
ROCKY MOUNTAIN REGION, INC.

OTHER MISCELLANEOUS - OCLC

OCLC Plans

1. Subject approach: will not start designing system until 1975. More sophisticated title approach: same schedule.
2. Serials: one on-line system now. Will also include automatic claiming and binding, check-in.
3. Interlibrary loans: negotiation for this system may occur prior to 1975.
4. Remote access and circulation control: 1975 at earliest.
5. There would be separate contracts for each new system.

Present Cost Figures

1. If equipment owned and maintained by OCLC, line charges paid by OCLC, cost of staff and R & D at OCLC: $2.02 per title found, or "hits". If equipment owned and maintained by Bib Center or Bib Center/ libraries in region and transmission costs paid by us: 87.5¢ per title found, or "hits".
2. Card production: 3.4¢ per card produced.
3. No membership fee for Bib Center as such.
4. Operational staff within each institution should be clerical level.
5. Bib Center or consortium should fund staff to train at OCLC and in turn train staff of each participating institution.
6. No present charges for retrospective conversion.
7. An "economically viable" contract should cost cut, dependent upon location/centralization of system at $3 or less.

Other Local Needs

1. Finance Committee to establish, review and evaluate costs.
2. Membership Committee to set standards for input cataloging.

Recommendations and Actions

1. Move first on participation before considering Bib Center catalog input.
2. Contract will be signed only if there is a viable group; final contract details will be in presence of legal counsel from both sides.
3. On-site study or consultation for experience record: Ohio State University, Cornell, Dartmouth: Public Libraries: Dayton, Toledo, Youngstown, Carnegie Library of Pittsburgh; Federal Library Committee: James Riley, Russell Shank.

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6. Staff replacement for Phil Long who has just left and was the knowledgeable force in operation of SIGMA 5? - No replacement for Long may be made.

7. What is the rationale which persuaded the OCLC Board to continue expanding? - Expiration or subsidies; interest in guarantee of self-support; national network interest.

8. What are limitations regarding number of locations possible of imput into system? Would this arrest what Bib Center can input? - No limitations as to location input. There would be a retrospecive line charge each time a new location entered since data would have to reformated on occasion of each new item entered. For example, a one-time charge would occur is we added retrospective information with locations batched; each location later entered for a title previously entered would occasion a new line charge. Bib Center would have to continue to "blend" or batch locations, or cost out alternative methods.

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